Our World of ATRP From surfaces over fluorinated copolymers to gold nanoparticles and biologically active miktoarm stars

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From surfaces over fluorinated copolymers to gold nanoparticles and biologically active miktoarm stars

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The presentation will be a journey through the last decade illuminatıng our activities in the World of atom transfer radical polymerization (ATRP). Since the early start where we established the ATRP potential[1,2] of pentafluorostyrene (FS) we have extencively exploited the advantages of this controlled polymerization technique in the development of a multitude of different polymer materials responsive to various external stimuli the socalled smart polymer materials. All of the basic advantages of ATRP: polymerization of functional monomers and control of polymer chain structure, end-groups, reactivity, molecur weight and the relatively narrow polydispersity have been exploited to prepare block and star copolymers and employ surface-intiated polymerization. In addition, multifunctional initiators and macroinitiators based on both commercially available and in-house prepared polymers as well as macromonomers have been utilized.

The continued tour will elucidate the application of FS as the workhorse for development of low energy surface materials,[3] triblock copolymers intended as electrolytes for Li^+ batteries,[4] nearly insoluble fluorinated nanoparticles,[5] and fluorinated copolymers with pendant sulfonates intended for hydrogen fuel cells.[6] The applicability of ATRP was later additionally extended to prepare (co)polymers from flourinated and other functional methacrylates.[7-10] In our hands also azobenzene containing block copolymethacrylates have shown a promising potential for volume holographic optical storage.[11-14] The star concept has also been employed in the preparation of amphiphilic model block copolymers for rheological investigations.[15,16] The attractive surface-initiated ATRP concept has been exploited by grafting styrene from cellulose,[17] and more recently used to create biofunctional surfaces[18] e.g. PPEGMA on PEEK[19] and PP able to repell a protein such as insulin aspart[B28]. Most recently novel bionanomaterials have been prepared by combination of ring opening polymerization (ROP) and ATRP resulting in cancer therapeutic gold nanoparticles.[20] In addition, a combination of "click chemistry" and ATRP furnished miktoarm core crosslinked stars with the biologically active moieties, estradiol and L-lysine, on the surface.[21]

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